

--	--	--	--	--	--	--	--	--	--

First/Second Semester B.E. Degree Examination, Dec. 2015/Jan.2016
Basic Electrical Engineering

Time: 3 hrs.

Max. Marks: 100

- Note:** 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.
 2. Answer all objective type questions only on OMR sheet page 5 of the answer booklet.
 3. Answer to objective type questions on sheets other than OMR sheet will not be valued.

PART – A

- 1 a. Choose the correct answers for the following : (04 Marks)
- i) The ohm's law cannot be applied to _____
 A) resistance B) inductance C) capacitance D) diode
- ii) If 100 V is applied across a 200 V, 100 W bulb, the power consumed will be _____
 A) 100 W B) 50 W C) 25 W D) 12.5 W
- iii) The self inductance 'L' is given by _____
 A) $N\phi I$ B) $\frac{NI}{\phi}$ C) $\frac{N\phi}{I}$ D) $I/N\phi$
- iv) An emf of 7.2 volts is induced in a coil of 6 mH. Then the rate of change of current is _____
 A) 12 A /sec B) 120 A/sec C) 1200 A/sec D) 12000 A/sec
- b. State and explain Kirchoff's laws. (06 Marks)
- c. A 8 ohm resistor is in series with a parallel combination of two resistors 12 ohm and 6 ohm. If the current in the 6 ohm resistor is 5 A. Determine the total power dissipated in the circuit. (05 Marks)
- d. A coil consists of 600 turns and a current of 10 A in the coil gives rise to a magnetic flux of 1 mwb. Calculate :
 i) self inductance
 ii) the emf induced
 iii) the energy stored
 when the current is reversed in 0.01 sec. (05 Marks)
- 2 a. Choose the correct answers for the following : (04 Marks)
- i) The average power consumption of a pure inductor is _____
 A) maximum B) minimum C) zero D) infinity
- ii) The power factor of a resistive load (circuit) is _____
 A) zero B) unity C) lagging D) leading
- iii) Inductive reactance of a coil of inductance 0.6 H at 50 Hz is _____
 A) 18.5 Ω B) 25 Ω C) 50 Ω D) 188.52 Ω
- iv) The peak value of a sine wave is 400 V its average value is _____
 A) 254.8 V B) 282.6 V C) 400 V D) 565 V.
- b. Define : i) Amplitude ii) Frequency iii) form factor iv) power factor in AC circuits. (04 Marks)
- c. Define and derive an expression for root mean square (RMS) value of an alternating quantity. (06 Marks)
- d. A circuit consists of resistance 10 ohm, an inductance of 16 mH and a capacitance of 150 μ F connected in series. A supply of 100 V, 50 Hz, is given to the circuit. Find the current, power factor and power consumed by the circuit. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

- 3 a. Choose the correct answers for the following : (04 Marks)
- In a 3 – phase system emf's are _____
A) 30° apart B) 60° apart C) 90° apart D) 120° apart
 - The power taken by a 3 –phase load is given by
A) $\sqrt{3}V_L I_L \cos \phi$ B) $3V_L I_L \cos \phi$ C) $\sqrt{3}V_L I_L \sin \phi$ D) $3V_L I_L \sin \phi$
 - In a 3 – phase delta system the relation between V_L and V_{ph} is _____
A) $V_L = \frac{V_{ph}}{\sqrt{3}}$ B) $V_L = \sqrt{3} - V_{ph}$ C) $V_L = V_{ph}$ D) none of these
 - If the two watt meters show equal reading, power factor is _____
A) zero B) 0.5 C) unity D) 0.866
- b. Obtain the relationship between the phase and line values of voltages and currents in a balanced star connected system. (08 Marks)
- c. A balanced delta connected load of $(8 + j6)$ ohm per phase is supplied from a 3–phase, 440V, source. Find the line current, power factor, power per phase and total power. (08 Marks)
- 4 a. Choose the correct answers for the following : (04 Marks)
- The dynamometer type watt meter is used to measure _____
A) only DC power B) only AC power
C) both DC and AC power D) both active and reactive power
 - In the energy meter constant speed of rotation of the disc is provided by _____
A) shunt magnet B) series magnet C) braking magnet D) none of these
 - The ratio of minimum fusing current/ current rating of a fuse is _____
A) fusing factor B) rated current C) fusing current D) melting point
 - A good earthing should provide _____ resistance.
A) low B) high C) medium D) none of these.
- b. With a neat diagram, explain the construction and working of dynamometer type watt meter. (08 Marks)
- c. What is the necessity of earthing? With a neat diagram explain pipe earthing. (08 Marks)

PART – B

- 5 a. Choose the correct answers for the following : (04 Marks)
- The emf generated by a DC generator depends on _____
A) flux only B) speed only
C) flux and speed D) terminal voltage
 - For 'P' pole lap wound armature of DC machine the number of parallel paths are _____
A) 2 B) 2P C) P D) P/2
 - A commutator is made up of _____
A) iron laminations B) copper segments
C) both iron laminations and copper segments D) none of these
 - In a 240 V DC motor $E_b = 220$ V, $R_a = 0.5 \Omega$, I_a is _____
A) 20 A B) 10 A C) 80 A D) 40 A
- b. A 4 pole, 1500 rpm DC generator has a lap wound armature having 24 slots with 10 conductors/ slot. If the flux/pole is 0.04 Wb. Calculate the emf generated in the armature. What would be the generated emf if the winding is wave connected? (06 Marks)
- c. What is back emf in DC motor? What is its significance? (05 Marks)
- d. Derive the torque equation of DC motor. (05 Marks)

- 6 a. Choose the correct answers for the following : (04 Marks)
- The core of the transformer is laminated to reduce _____
A) eddy current loss B) hysteresis loss C) copper loss D) friction loss
 - The copper loss of a certain transformer at half full load is 200 W. Then copper loss at full load will be _____
A) 100 W B) 200 W C) 400 W D) 800 W
 - The secondary current of 100/10 V transformer is 10 A then primary current is _____
A) 1 A B) 2 A C) 10 A D) 100 A
 - A transformer is working at its maximum efficiency with iron loss of 500 W. Then its copper loss will be _____
A) 250 W B) 500 W C) 1000 W D) 400 W.
- b. What are the losses occurring in a transformer? How do they vary with load? How they can be minimized. (06 Marks)
- c. Define voltage regulation of a transformer. What is its importance? (04 Marks)
- d. The primary winding of a transformer is connected to a 240 V, 50 Hz supply. The secondary winding has 1500 turns. If the maximum value of the core flux is 0.00207 wb. Determine :
i) the secondary induced emf ii) number of turns in the primary iii) cross – sectional area of the core. If the flux density has maximum value of 0.465 wb/m². (06 Marks)
- 7 a. Choose the correct answers for the following : (04 Marks)
- A salient pole field construction is used for alternator having _____
A) low and medium speed B) large speed
C) very large speed D) none of these
 - A 4 pole, 1200 rpm alternator generates at a frequency of _____
A) 25 Hz B) 40 Hz C) 50 Hz D) 100 Hz
 - The number of cycles generated in a 4 – pole alternator in one revolution is _____
A) 2 B) 6 C) 50 D) none of these
 - For full pitch coil, the pitch factor k_p is _____
A) 1 B) greater than 1 C) less than 1 D) none of these
- b. With neat diagram, explain the constructional features of 3 – phase alternator. (08 Marks)
- c. A 6 – pole, 3 – phase, star connected alternator has 90 slots and 8 conductors/slot, and rotates at 1000 rpm. The flux per pole is 0.05 Wb. Find the induced emf across its line. Take $K_d = 0.97$ and $K_c = 0.96$. (08 Marks)
- 8 a. Choose the correct answers for the following : (04 Marks)
- An induction motor works with _____
A) DC only B) AC only C) both DC and AC D) none of these
 - Slip of an induction motor at stand still is _____
A) zero B) one C) infinity D) none of these
 - Synchronous speed of an induction motor is given by _____
A) $120 fp$ B) $\frac{120f}{p}$ C) $\frac{120P}{f}$ D) $\frac{fp}{120}$
 - The speed of an induction motor is _____ that of NS
A) greater than B) less than C) same as D) double.
- b. Explain the principle of operation of 3 – phase induction motor. (05 Marks)
- c. Derive an expression for rotor induced emf frequency of an 3 – phase induction motor. (05 Marks)
- d. A 6 pole induction motor supplied from a 3 – phase, 50 Hz supply has a rotor frequency of 2.3 Hz. Calculate : i) The percentage slip ii) The speed of the motor. (06 Marks)

* * * * *